



Tips on safe Excavation

Following the recent prosecution of two basement contractors for failings and another contractor fined for a site accident where a worker was injured after a trench collapse, the Health and Safety Executive (HSE) had issued a series of warnings about safe work practices during ground works.


HSE principal inspector Emma Stiles commented: “ Basement work must be properly planned to ensure the structural integrity of the building

throughout the construction work. When this type of work is done badly, workers and members of the public are at significant risk of serious injury or death. In addition, we cannot underestimate the impact on the homeowners when their properties are extensively damaged.” HSE inspector Alison Outhwaite commented: “The trench case highlights the need to be aware of the risks of working in and near excavations. The groundwork industry needs to appreciate the risks even where excavations are thought to be “shallow” or the ground considered to be stable.”

Risks connected with excavation

Excavation works are connected with the high risk of damage to the underground services.





Damage to electricity cables is a major hazard and in some cases it can cause fatal injuries to workers. It is necessary to inform workers about any live cables in the excavation and to put adequate measures to prevent damage. Incidents may arise from cables, connection and terminations which have been damaged or worn out. Most cables are laid in trenches between 450 mm and 1 m deep. Other services like gas pipes may be at risk from live electricity and could cause explosions.

The damage to gas pipes and connections can cause leaks or explosions. The depth of gas services cover ranges from 350 mm- 750 mm.

The damage to water pipes may cause injuries and can affect other nearby services or reduce support for other structures. If the primary pipes are damaged there is a risk of flooding or collapse of support. Water can also damage gas pipes. Water pipes are generally located at depths of 900 mm or more.

In case of the damage to sewers, there is the possibility of the ground collapse and contamination. Risks connected with damage to other pipes depends on the type of the fluid and include for instance risk of poisoning, injury, the risk of asphyxiation.

The damage to phone and TV cables will cause additional costs of repairs. Flammable and toxic gases can enter cable-carrying ducts, particularly if the duct has been damaged. Such gases can accumulate in chambers, manholes etc. and pose a risk to operatives who may need to work there.

As a part of the safe excavation, it is necessary to detect and identify any underground services. Moreover, all services have to be adequately marked. In case the excavation works will run nearby the underground services the operators of these services should be connected and should help in detection and relocation of services in the work area. Often local authorities, utility providers and contractors have to cooperate in this matter.

Detection of underground services

The position of underground services in or near the proposed work area should be adequately assessed using a detecting device in conjunction with current service plans. Plans instead do not show the position of gas service connections and its presence should be estimated. The assumed line of the service connection pipe from



the gas meter position, or from the point of entry into the premises should be marked. There are various types of detecting devices for example:

- hum detectors for electricity cables
- radio frequency detectors for metal pipes and cables
- transmitter/ receiver instruments
- Metal detectors can locate flat metal covers, joint boxes etc.
- Ground probing radar - for cable, duct or pipe detection (however, it will not identify the type of the service)
- Radio frequency identification (RFID)-markers placed on new services to allow for easy detection and identification.

Safe excavation

The law (The Construction (Design and Management) Regulations 2007) implies on the main contractor or employer the responsibility for the site safety during excavation. The process of excavation must be carefully planned and adequate tools must be carefully selected, maintained and operated by trained drivers.

Before works start, contractors should be given a written plan with information about the location and nature of underground services. Workers should be competent (preferably ASUC registered) and provided with appropriate PPE and work equipment. Identified services should be carefully exposed and marked. Backfilling of excavations must adequately support and protect the underground services. Con-

crete must not be used to encase services when backfilling. In case of damage to any underground service during the excavation or subsequent work, the operator should be informed immediately. In the case of electricity cables, gas pipes, other pipelines or high-pressure water mains, workers and public should be kept away until it has been repaired.

Safe digging procedures include:

- Allow time for detection of the underground service,
- Mark the position and route of the underground service
- Identify the type of the service properly.
- Assume all services are live until proven safe (obtain written confirmation of disconnection)



- Equip workers with PPE
- Proceed with excavating by digging trial holes
- Use the service locators frequently
- Take special care when digging above or close to the service
- Install additional support to nearby structures if needed
- Carefully plan the mechanical excavation as it is common cause of damage to services (always at least one another person should assist the excavator driver)
- Excavate alongside the service not directly above it
- Avoid using hand-held power tools over the unexposed service
- Use mechanical excavators and power tools to break up hard surfaces
- Exposure of the services should be done by horizontal digging with insulated tools (spades, shovels).
- Vacuum excavation with water jetting or air jets is effective and safe. However, it will not work in case of hard surfaces like concrete.

- Damage to a gas pipe with an excavator is more dangerous than if the damage is done with a hand-held power tool. The opposite rule applies for electricity cables.
- Keep in mind that damage may be unseen
- Ensure precautions are in place for falling objects,
- Support the exposed services and never use handholds/footholds for climbing out of excavations.
- Keep in mind that excavation may affect the support for a gas pipe
- Adequately support excavations with the use of shuttering, shoring or a trench box system
- Take care while backfilling excavations with fine material or sand to avoid damages to the service. Hardcore and rocks should not be used. Backfill should be compacted
- Never attempt repairs. Notify the service operator

For more detailed information on excavating please visit www.hse.gov.uk

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